LHT52 Temperature & Humidity Sensor User Manual

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Image Version: v1.0

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1.0	Release	2021-Dec-31

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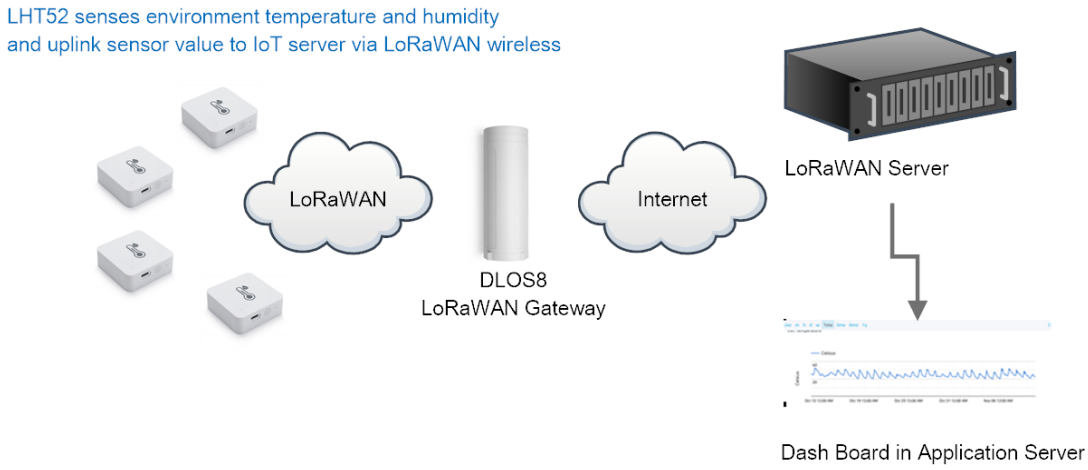
1. Introduction

1.1 What is LHT52 Temperature & Humidity Sensor

The Dragino LHT52 Temperature & Humidity sensor is a Long Range LoRaWAN Sensor. It includes a built-in Temperature & Humidity sensor and has a USB Type-C sensor connector to connect to external sensors such as external Temperature Sensor.



LHT52 senses environment temperature and humidity and send these values via long-range wireless LoRaWAN protocol. It targets professional wireless sensor network applications such as food service, smart metering, smart cities, building automation, and so on.

LHT52 supports 2 x AAA batteries and works for a long time up to several years. Use can replace the batteries easily after they are finished.

LHT52 is fully compatible with LoRaWAN v1.0.3 protocol, it can work with standard LoRaWAN gateway.

LHT52 supports Datalog feature to make sure users won't miss sensor data. It records sensor value for every uplink. These values can be retrieved by LoRaWAN server via downlink command.

LHT52 supports temperature alarm feature. It can uplink alarm in a short interval while temperature exceeds preset limits.

*Battery life depends how often to send data, please see battery analyzer.

1.2 Features

- ✓ Wall Attachable.
- ✓ LoRaWAN v1.0.3 Class A protocol.
- ✓ Built-in Temperature & Humidity sensor
- ✓ Optional External Probe
- ✓ Frequency Bands: CN470/EU433/KR920/US915/EU868/AS923/AU915
- ✓ AT Commands to change parameters
- ✓ Remote configure parameters via LoRaWAN Downlink
- ✓ Firmware upgradable via program port
- ✓ Support 2 x AAA LR03 batteries.
- ✓ Datalog feature
- ✓ IP Rating: IP52

1.3 Specifications

Built-in Temperature Sensor:

- ➢ Resolution: 0.01 °C
- ➢ Accuracy Tolerance: Typ ±0.3 °C
- ➢ Long Term Drift: < 0.02 °C/yr
- ➢ Operating Range: -20 ~ 50 °C

Built-in Humidity Sensor:

- ➢ Resolution: 0.1 %RH
- ➢ Accuracy Tolerance: Typ ±3 %RH
- ➢ Long Term Drift: < 0.02 °C/yr
- ➢ Operating Range: 0 ~ 99.0 %RH(no Dew)

1.4 Power Consumption

LHT52 (without external sensor): Idle: 5uA, Transmit: max 110mA

LHT52 + External Temperature Probe (AS-01): Idle: 6uA, Transmit: max 110mA.

1.5 Storage & Operation Temperature

-20°C to +50°C

1.6 Applications

- ✓ Smart Buildings & Home Automation
- ✓ Logistics and Supply Chain Management
- ✓ Smart Metering
- ✓ Smart Agriculture
- ✓ Smart Cities
- ✓ Smart Factory

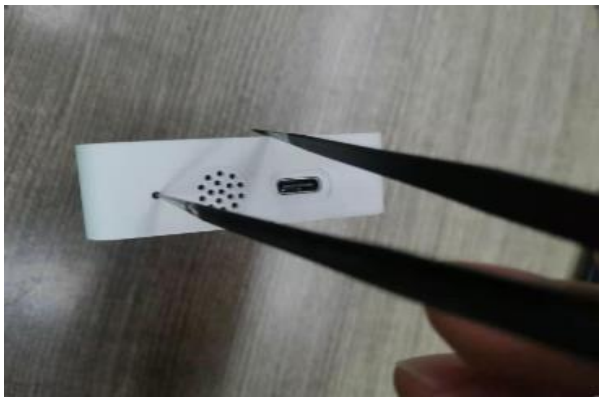
2. Operation Mode

2.1 How to activate LHT52?

1. Open enclosure from below position.

2. Insert 2 x AAA LR03 batteries.

3. Press the reset button to activate device.



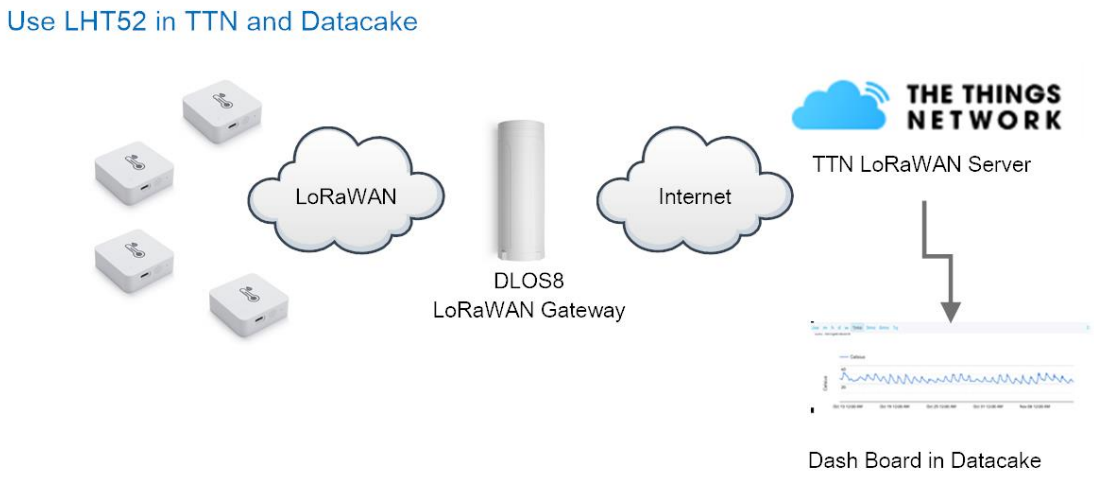
User can check LED Status to know the working state of LHT52.

2.2 How it works?

Each LHT52 is shipped with a worldwide unique set of LoRaWAN OTAA keys. To use LHT52 in a LoRaWAN network, user needs to input the OTAA keys in LoRaWAN network server. After this, if LHT52 is under this LoRaWAN network coverage, LHT52 can join the LoRaWAN network and start to transmit sensor data. The default period for each uplink is **20 minutes**.

2.3 Example to use for LoRaWAN network

This section shows an example for how to join the TheThingsNetwork LoRaWAN IoT server. Usages with other LoRaWAN IoT servers are of similar procedure.

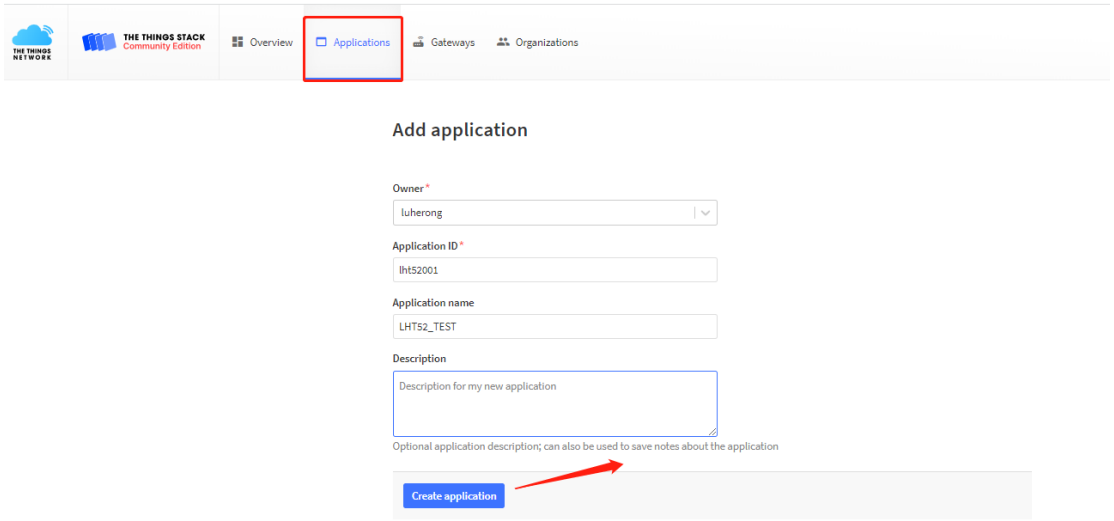


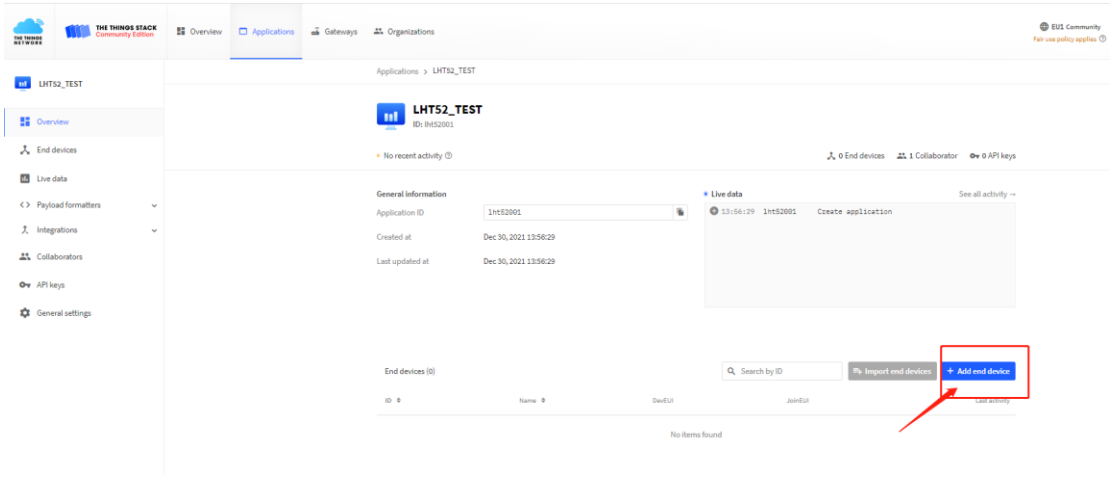
Assume the DLOS8 is already set to connect to TTN V3 network . We need to add the LHT52 device in TTN V3 portal.

Step 1: Create a device in TTN V3 with the OTAA keys from LHT52.
Each LHT52 is shipped with a sticker with the default DEV EUI as below:

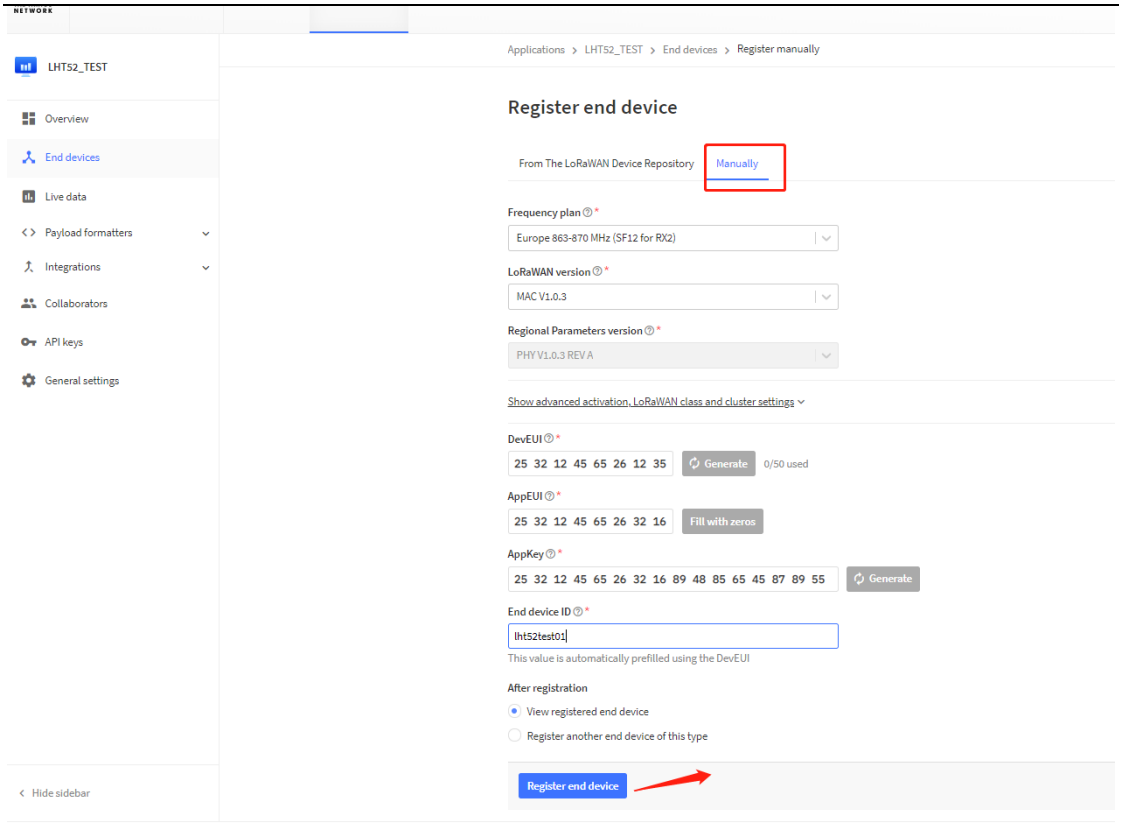
Enter these keys in the LoRaWAN Server portal. Below is TTN V3 screen shot:
Add APP EUI in the application.
choose to create the device manually.

Add APP KEY and DEV EUI

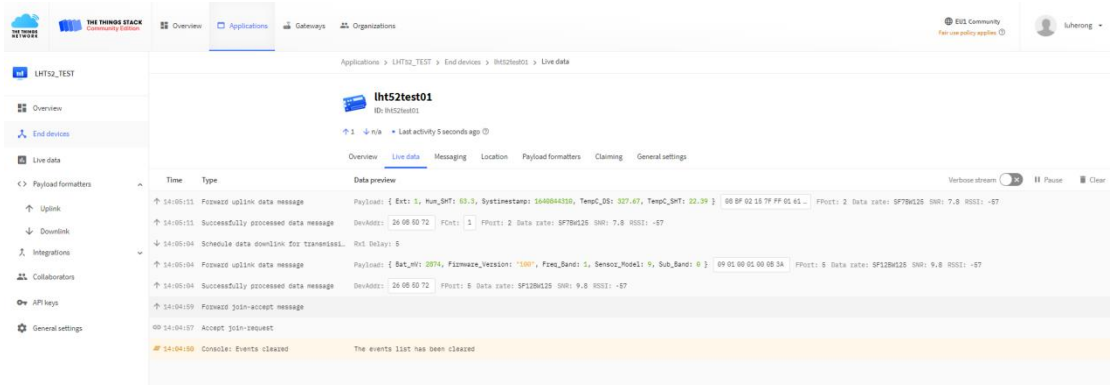




Default mode OTAA



Step 2: Use ACT button to activate LHT52 and it will auto join to the TTN V3 network. After join success, it will start to upload sensor data to TTN V3 and user can see in the panel.



2.4 Uplink Payload

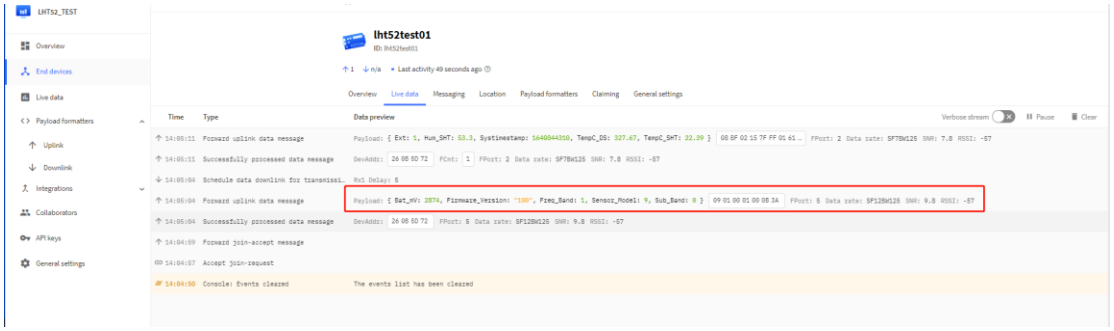
Uplink payloads include two types: Valid Sensor Value and other status / control command.

- Valid Sensor Value: Use FPORT=2
- Other control command: Use FPORT other than 2.

2.4.1 Uplink FPORT=5, Device Status

Uplink the device configures with FPORT=5. Once LHT52 Joined the network, it will uplink this message to the server. After first uplink, LHT52 will uplink Device Status every 12 hours.

Size (bytes)	1	2	1	1	2
Value	Sensor Model	Firmware Version	Frequency Band	Sub-band	BAT



Example Payload (FPort=5):

09 01 00 01 00 0B 3A

Sensor Model: For LHT52, this value is 0x09.

Firmware Version: 0x0100, Means: v1.0.0 version.

Frequency Band:

*0x01: EU868

*0x02: US915

*0x03: IN865

*0x04: AU915

*0x05: KZ865

*0x06: RU864

*0x07: AS923

*0x08: AS923-1

*0x09: AS923-2

*0x0a: AS923-3

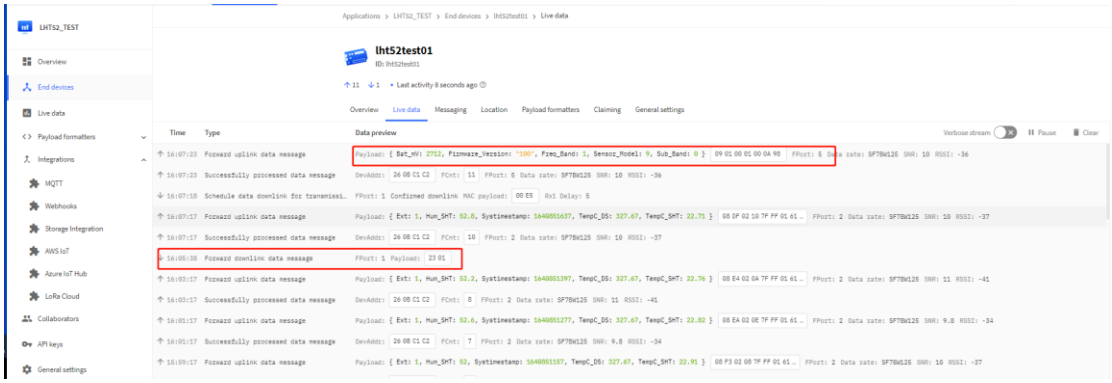
Sub-Band: value 0x00 ~ 0x08(only for CN470, AU915,US915. Others are0x00)

BAT: shows the battery voltage for LHT52.

Ex1: 0x0B3A = 2874mV

Use can also get the Device Status uplink through the downlink command:

Downlink:0x2301



2.4.2 Uplink FPORT=2, Real time sensor value

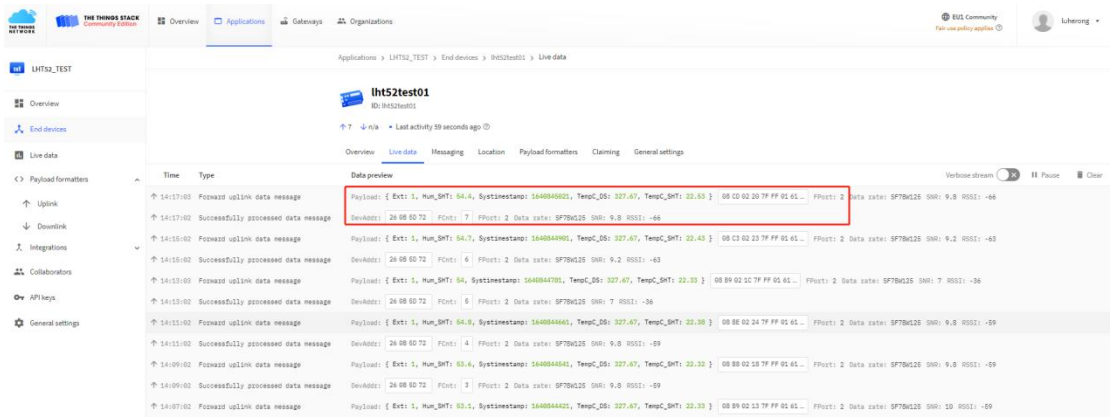
LHT52 will send this uplink after Device Status uplink once join LoRaWAN network successfully.

And it will periodically send this uplink. Default interval is 20 minutes and can be changed.

Uplink uses FPORT=2 and every 20 minutes send one uplink by default.

Size(bytes)	2	2	2	1	4
Value	Temperature	Humidity	External Temperature	Ext #	Unix TimeStamp

Temperature:



Example Payload (FPort=2):

08 CD 02 20 7F FF 01 61 CD 4E DD

Temperature & External Temperature:

- Example1: 0x08CD/100=22.53℃
- Example2: (0xF5C6-65536)/100=-26.18℃

Humidity:

- Humidity: 0x0220/10=54.4%

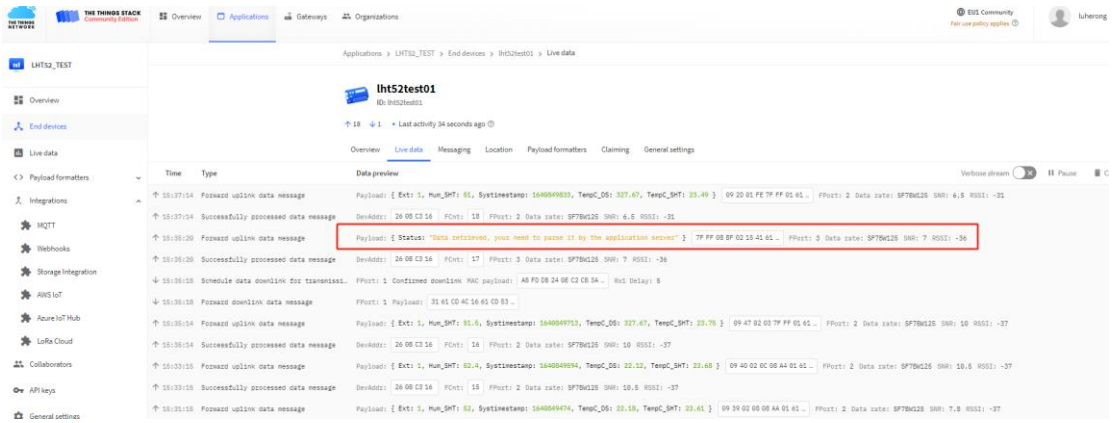
Extension #

Bytes for External Sensor:

EXT # Value	External Sensor Probe
0x01	Sensor AS-01, Temperature

2.4.3 Uplink FPORT=3, Datalog sensor value

LHT52 stores sensor value and user can retrieve these history value via downlink command. The Datalog sensor value are sent via FPORT=3.



- Each data entry is 11 bytes, to save airtime and battery, LHT52 will send max bytes according to the current DR and Frequency bands.

  For example, in US915 band, the max payload for different DR is:

  a) DR0: max is 11 bytes so one entry of data

  b) DR1: max is 53 bytes so devices will upload 4 entries of data (total 44 bytes)

  c) DR2: total payload includes 11 entries of data

  d) DR3: total payload includes 22 entries of data.

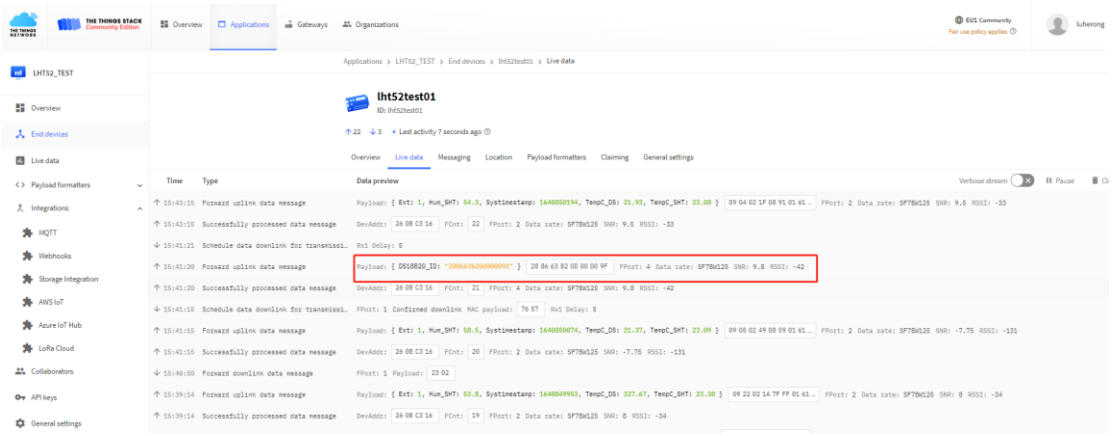
Notice: LHT52 will save 178 set of history data, If device doesn't have any data in the polling time. Device will uplink 11 bytes of 0.

See more info about the Datalog feature.

2.4.4 Uplink FPORT=4, DS18B20 ID

User can get external DS18B20 ID through the downlink command.

Downlink:0x2302



Example Payload (FPort=4):

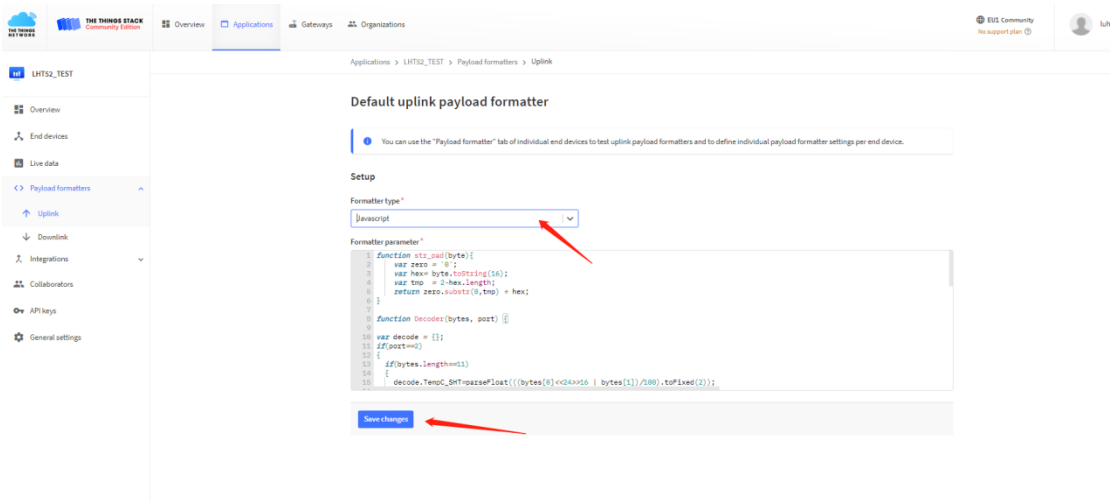
28 86 63 B2 00 00 00 9F

The External DS18B20 ID is 0x28 86 63 B2 00 00 00 9F

2.4.5 Decoder in TTN V3

In LoRaWAN protocol, the uplink payload is HEX format, user need to add a payload formatter/decoder in LoRaWAN Server to get human friendly string.

In TTN , add formatter as below:



Please check the decoder from this link:

https://www.dragino.com/downloads/index.php?dir=LoRa_End_Node/LHT52/Decoder/

2.5 Show data on Datacake

Datacake IoT platform provides a human friendly interface to show the sensor data in charts, once we have sensor data in TTN V3, we can use Datacake to connect to TTN V3 and see the data in Datacake. Below are the steps:

Step 1: Be sure that your device is programmed and properly connected to the LoRaWAN network.

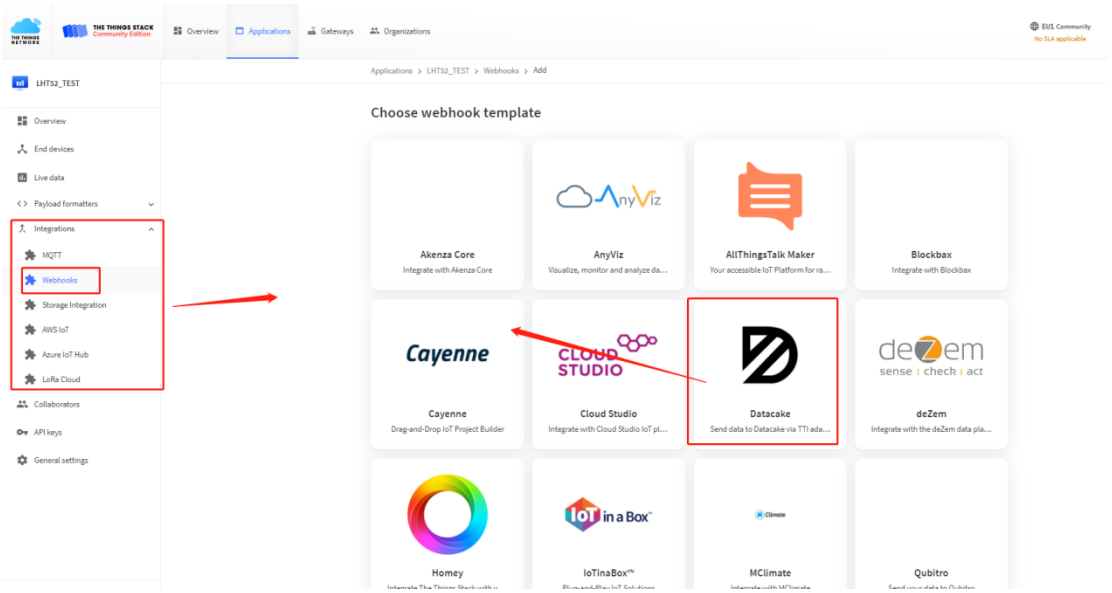
Step 2: Configure your Application to forward data to Datacake you will need to add integration. Go to TTN V3 Console --> Applications --> Integrations --> Add Integrations.

1.Add Datacake:

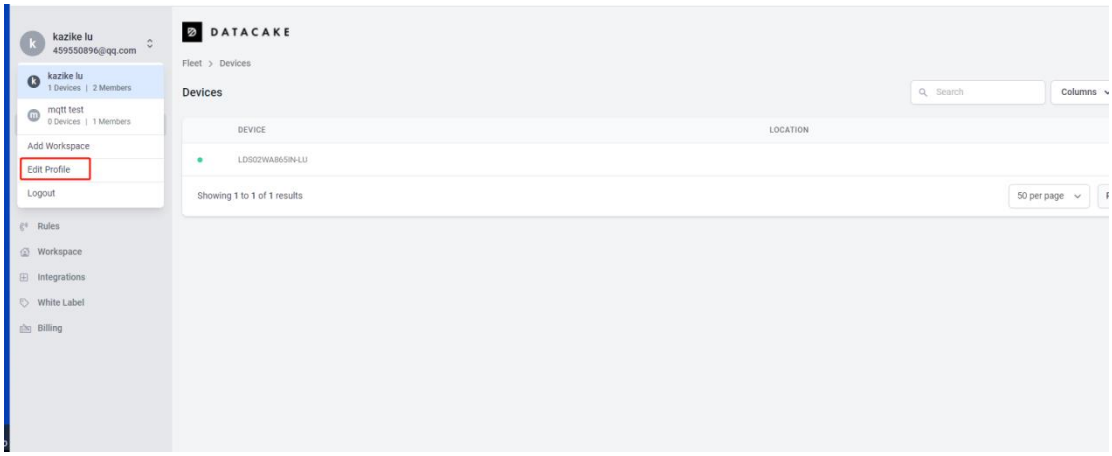
2.Select default key as Access Key:

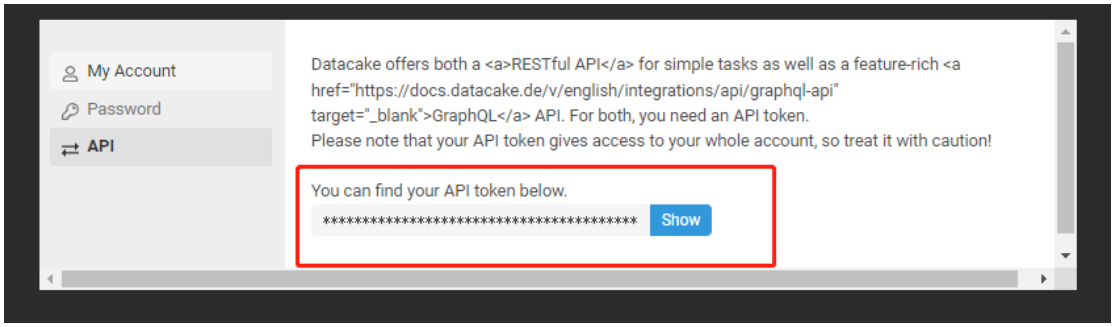
3.In Datacake console (https://datacake.co/) , add LHT52:

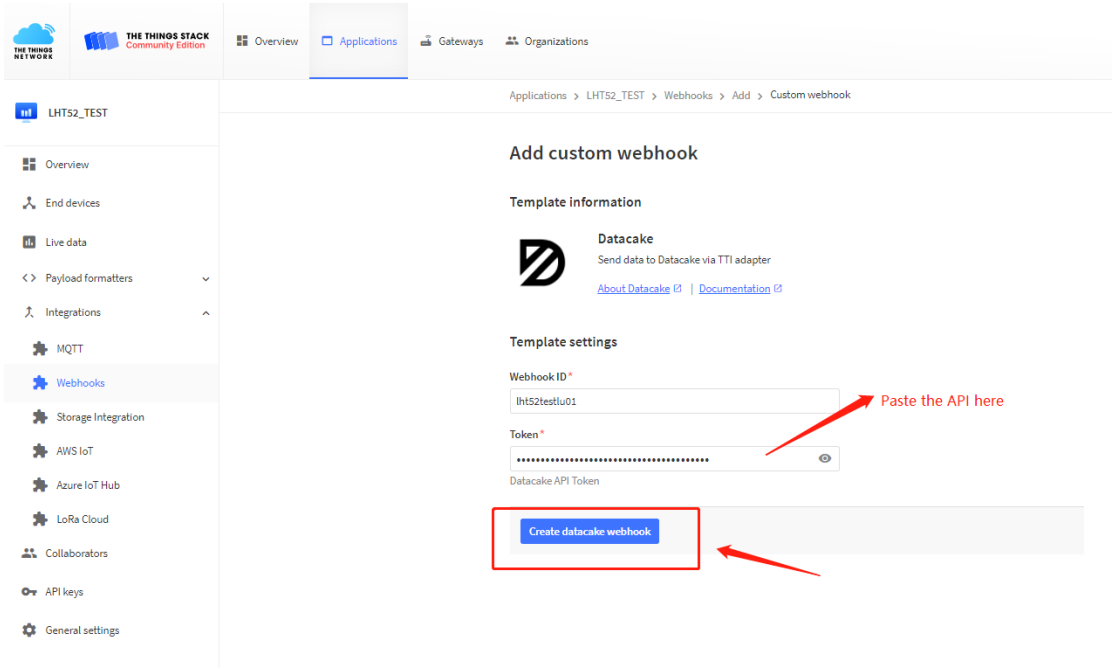
Please refer to the figure below

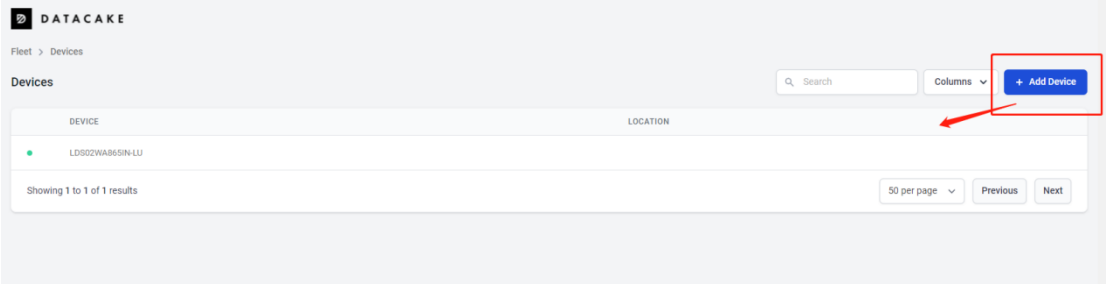


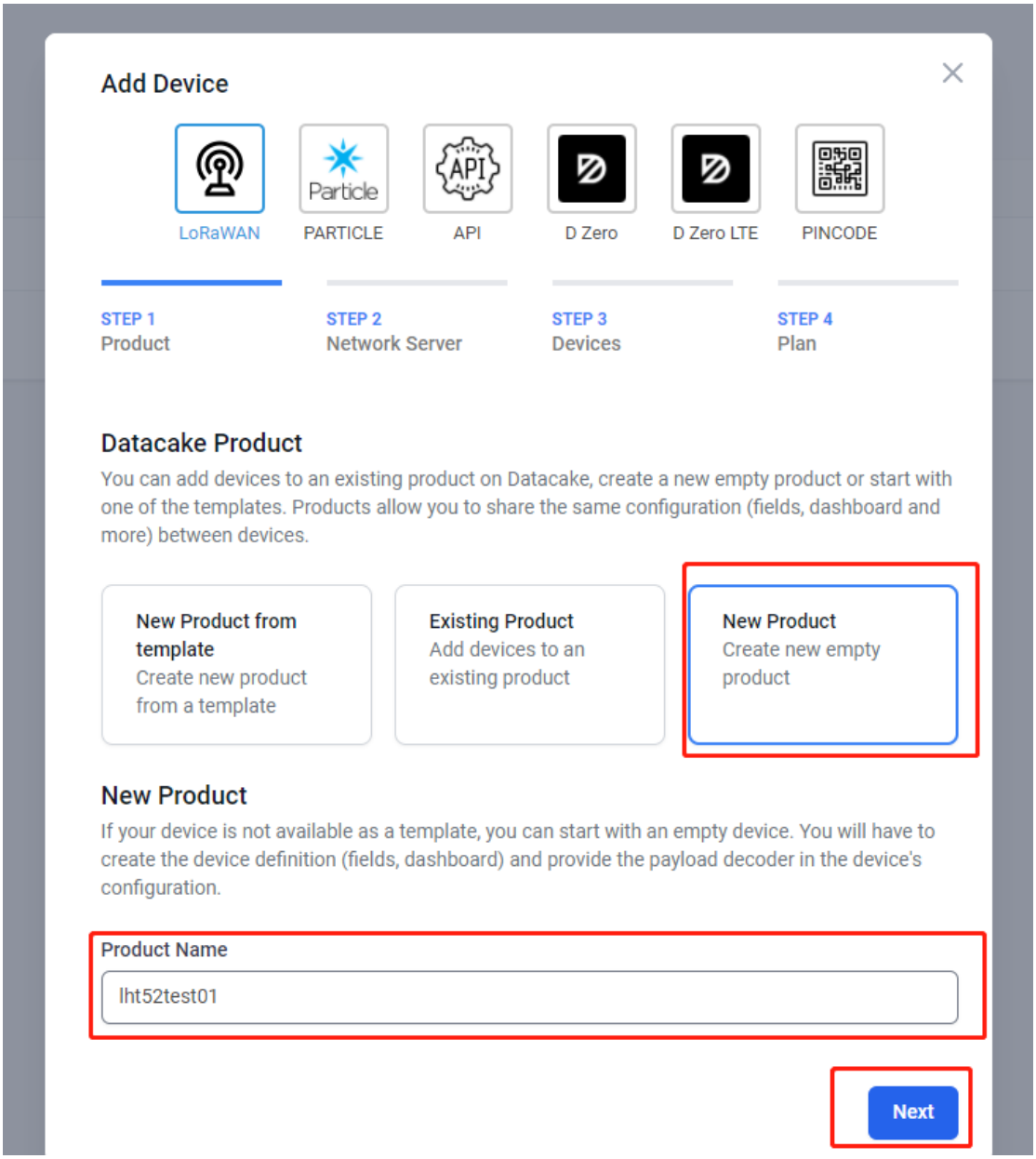
Log in to DATACAKE, copy the API under the account

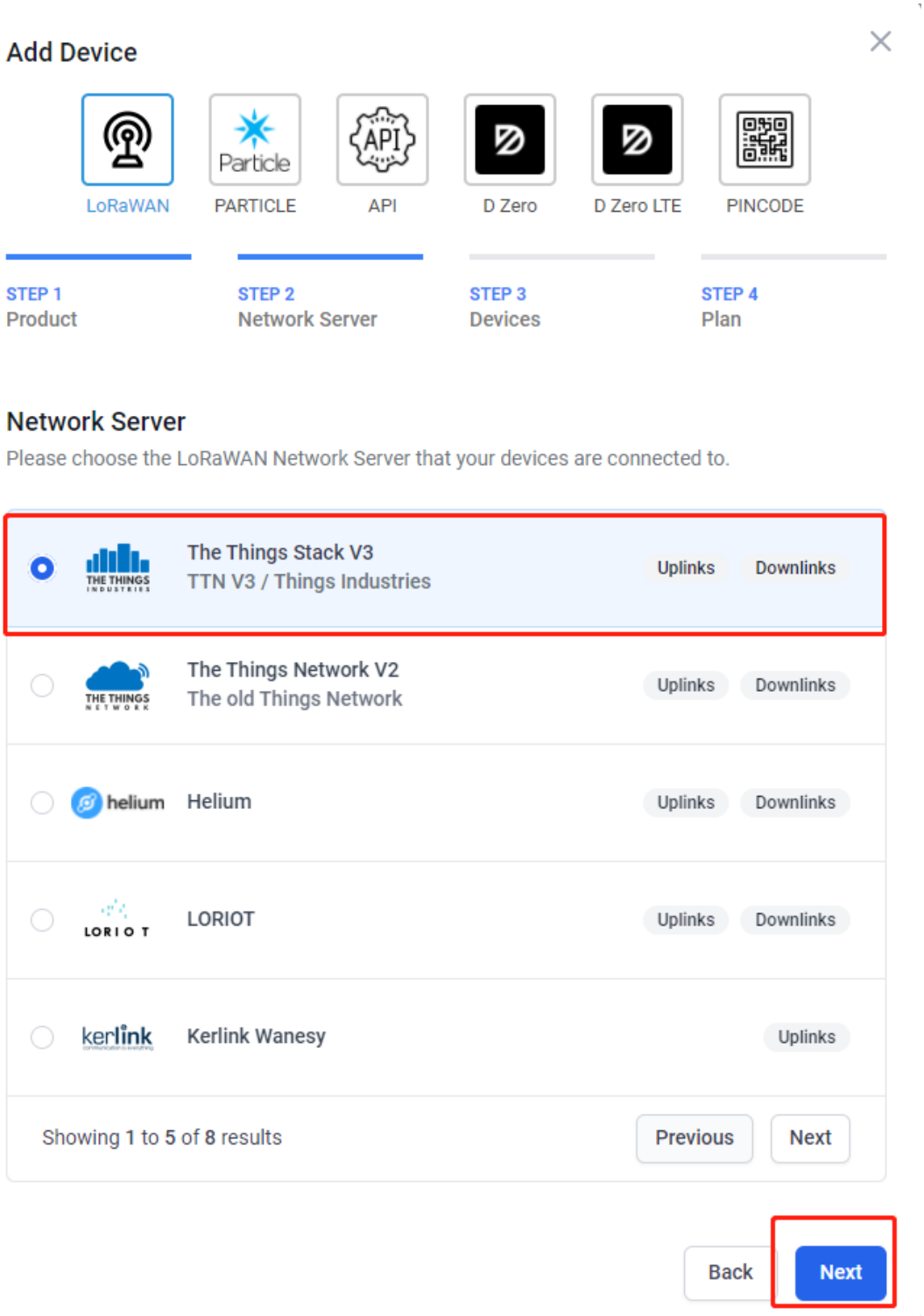


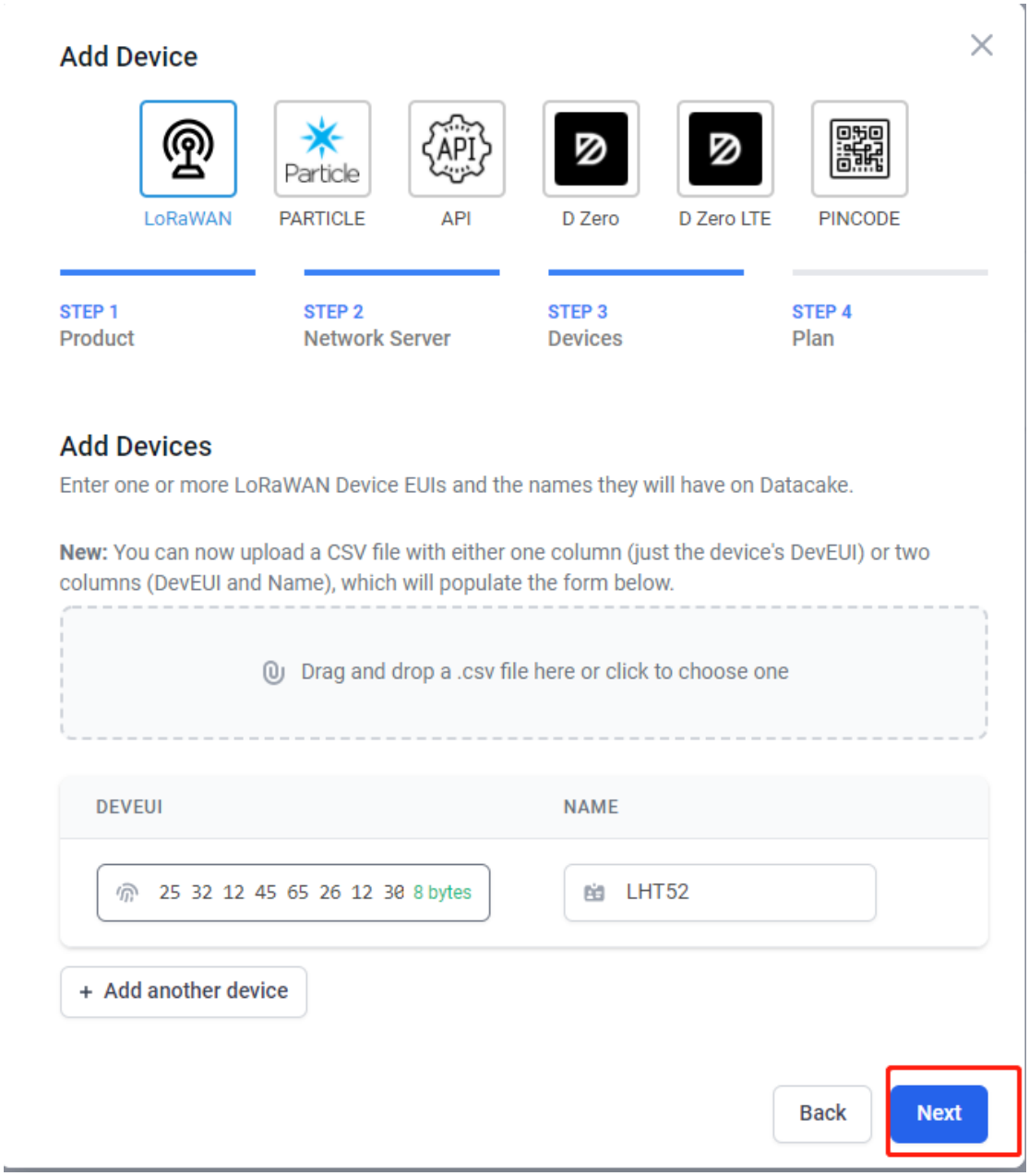


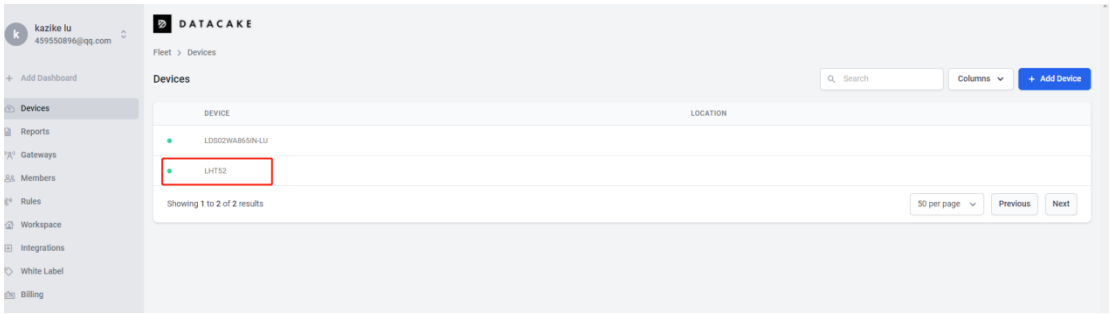


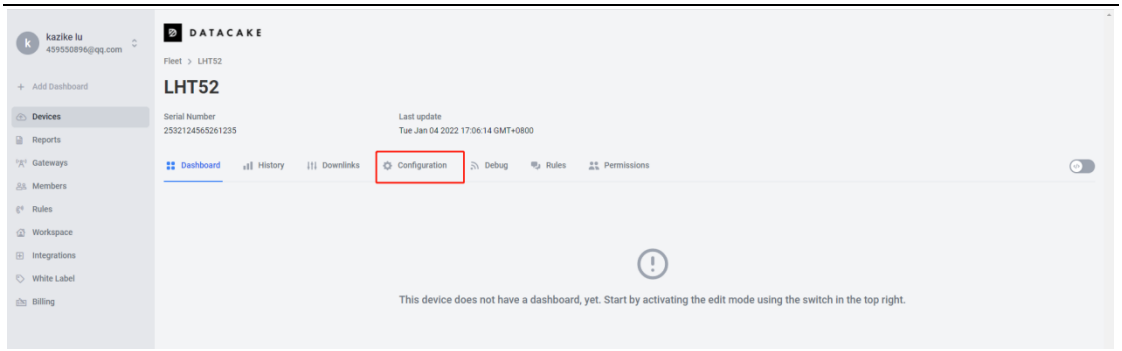

DATACAKE
Fleet > Devices
Devices
Search
Columns
+ Add Device
DEVICE
LOCATION
LDS02WA865IN-LU
Showing 1 to 1 of 1 results
50 per page
Previous
Next


Add Device
LoRaWAN
PARTICLE
API
D Zero
D Zero LTE
PINCODE
STEP 1
Product
STEP 2
Network Server
STEP 3
Devices
STEP 4
Plan
Datacake Product
You can add devices to an existing product on Datacake, create a new empty product or start with one of the templates. Products allow you to share the same configuration (fields, dashboard and more) between devices.
New Product from template
Create new product from a template
Existing Product
Add devices to an existing product
New Product
Create new empty product
New Product
If your device is not available as a template, you can start with an empty device. You will have to create the device definition (fields, dashboard) and provide the payload decoder in the device's configuration.
Product Name
lht52test01
Next

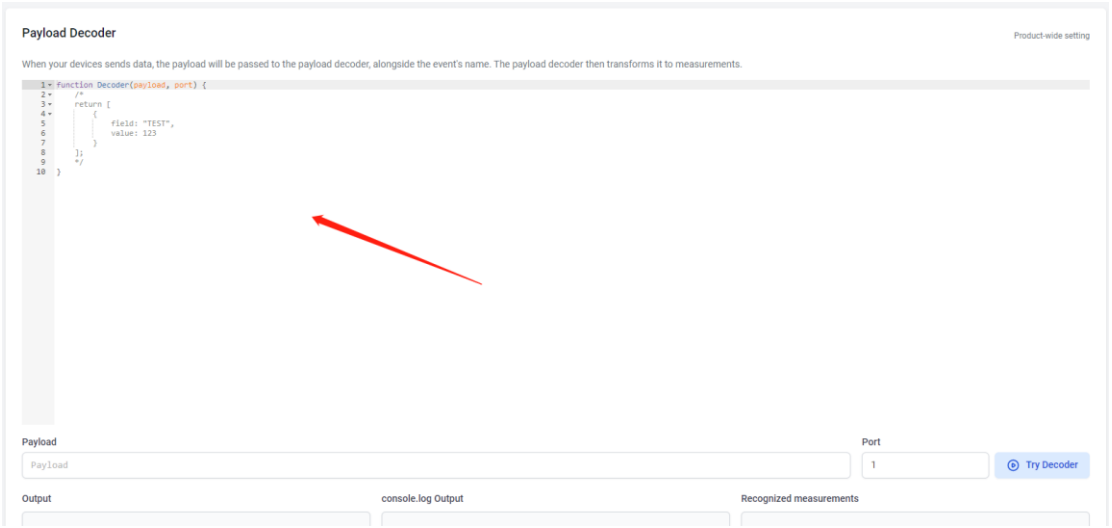

Add Device
LoRaWAN
PARTICLE
API
D Zero
D Zero LTE
PINCODE
STEP 1
Product
STEP 2
Network Server
STEP 3
Devices
STEP 4
Plan
Network Server
Please choose the LoRaWAN Network Server that your devices are connected to.
The Things Stack V3
TTN V3 / Things Industries
Uplinks
Downlinks
The Things Network V2
The old Things Network
Uplinks
Downlinks
Helium
Uplinks
Downlinks
LORIOT
Uplinks
Downlinks
Kerlink Wanesy
Uplinks
Showing 1 to 5 of 8 results
Previous
Next
Back
Next


Add Device
LoRaWAN
PARTICLE
API
D Zero
D Zero LTE
PINCODE
STEP 1
Product
STEP 2
Network Server
STEP 3
Devices
STEP 4
Plan
Add Devices
Enter one or more LoRaWAN Device EUIs and the names they will have on Datacake.
New: You can now upload a CSV file with either one column (just the device's DevEUI) or two columns (DevEUI and Name), which will populate the form below.
Drag and drop a .csv file here or click to choose one
DEVEUI
NAME
25 32 12 45 65 26 12 30 8 bytes
LHT52
+ Add another device
Back
Next

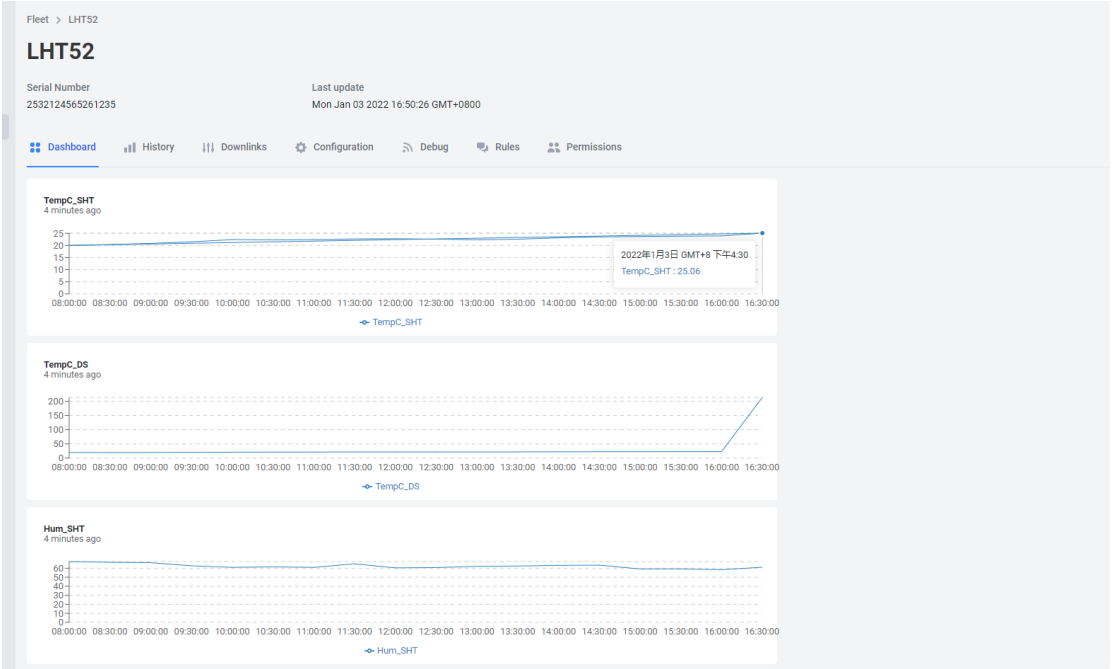

DATACAKE
Devices
Add Device
DEVICE
LOCATION
LHT52



Copy and paste the [TTN decoder] here and save



Visual widgets please read the DATACAKE documentation



2.6 Datalog Feature

When user want to retrieve sensor value, he can send a poll command from the IoT platform to ask sensor to send value in the required time slot.

2.6.1 Unix TimeStamp

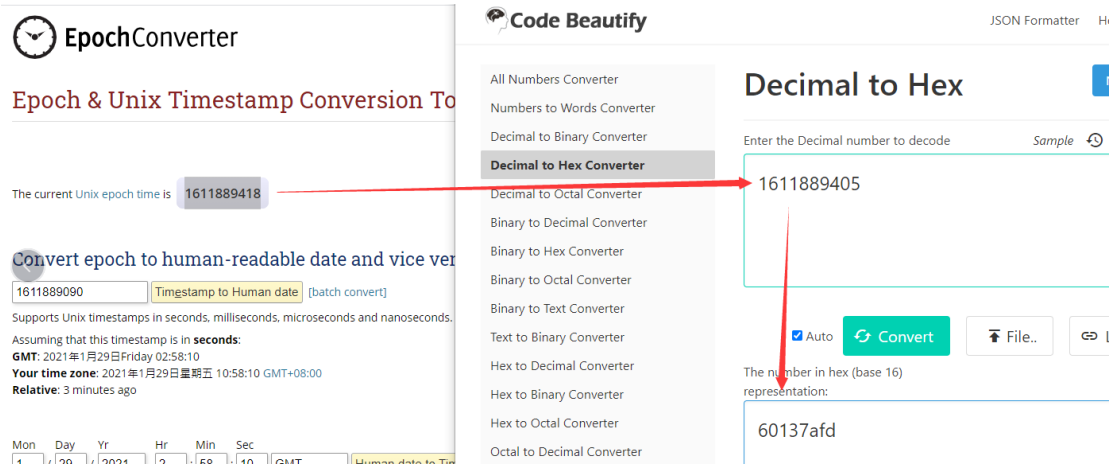
Unix TimeStamp shows the sampling time of uplink payload. format base on

Size (bytes)	4	1
DeviceTimeAns Payload	32-bit unsigned integer : Seconds since epoch*	8bits unsigned integer: fractional-second in ½^8 second steps

Figure 10 : DeviceTimeAns payload format

User can get this time from link: https://www.epochconverter.com/ :

For example: if the Unix Timestamp we got is hex 0x60137afd, we can convert it to Decimal: 1611889405. and then convert to the time: 2021 – Jan -- 29 Friday 03:03:25 (GMT)



2.6.2 Poll sensor value

User can poll sensor value base on timestamps from server. Below is the downlink command.

1byte	4bytes	4bytes	1byte
31	Timestamp start	Timestamp end	Uplink Interval

Timestamp start and Timestamp end use Unix TimeStamp format as mentioned above. Devices will reply with all data log during this time period, use the uplink interval.

For example, downlink command 31 5FC5F350 5FC6 0160 05

Is to check 2020/12/1 07:40:00 to 2020/12/1 08:40:00's data

Uplink Internal =5s， means LHT52 will send one packet every 5s. range 5~255s.

2.6.3 Datalog Uplink payload

See Uplink FPORT=3, Datalog sensor value

2.7 Alarm Mode

When device is in Alarm mode, it will check the built-in sensor temperature in a short interval. If the temperature exceeds the pre-configure range, it will send an uplink immediately.

The alarm mode can be modified by AT command or downlink, Alarm mode is disabled by default

If you need to enable the Alarm mode, please refer to the following

Note: Alarm mode will increase the power consumption, we recommend extending the normal uplink time (20 minutes default) when enable this feature.

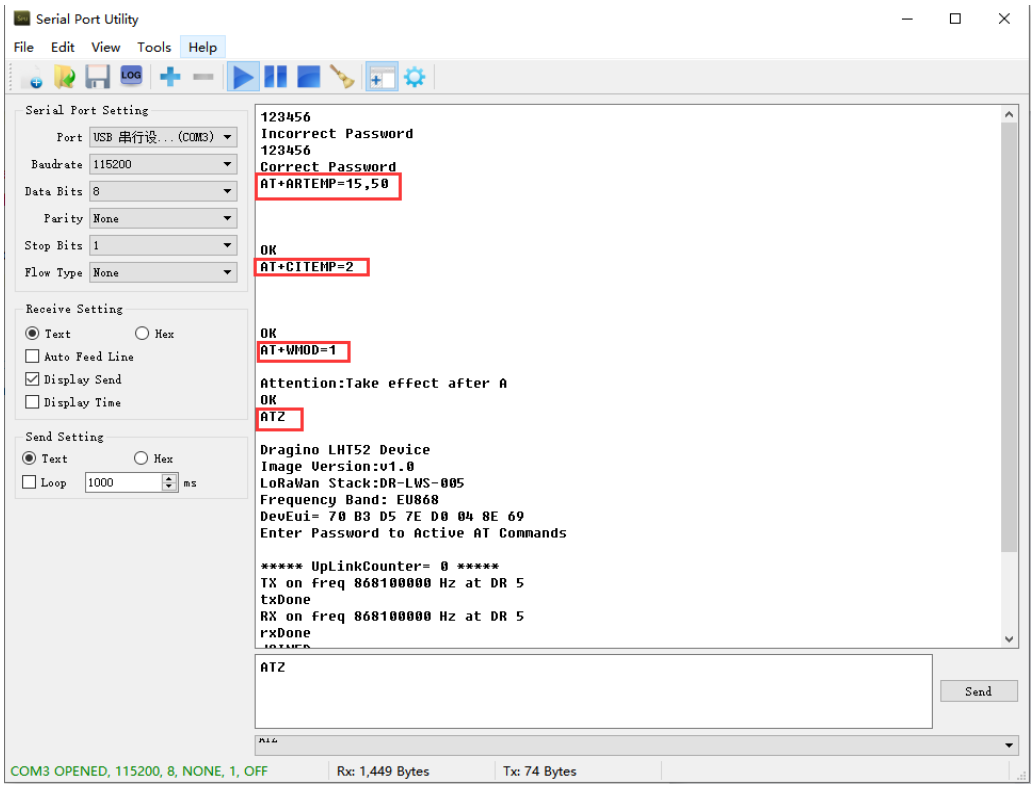
AT Commands for Alarm mode:

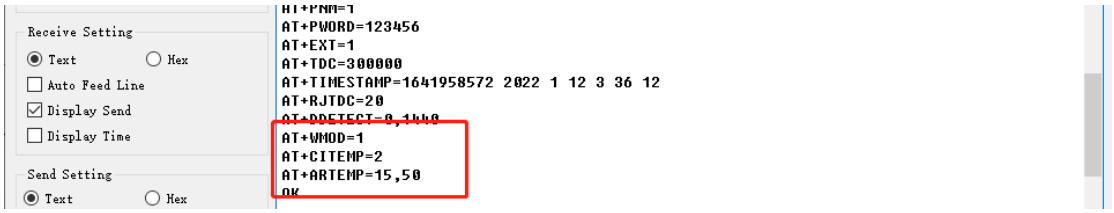
AT+WMOD=1: Enable/Disable Alarm Mode. (0:Disable, 1: Enable),need to reset the node to take effect

AT+CITEMP=1: The interval to check temperature for Alarm. (Unit: minute)

AT+ARTEMP=-40,125: Set the normal temperature range from -40° C to 125° C

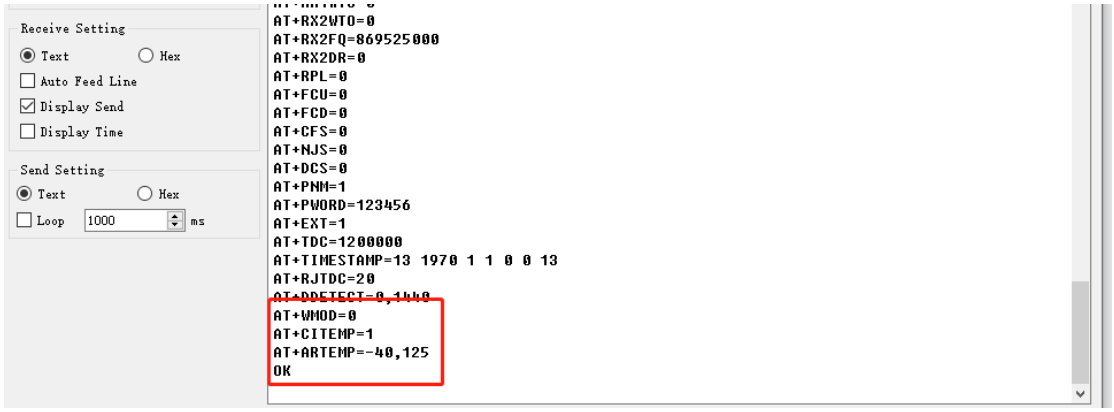
Suppose you want to set the normal temperature from 15°C to 50°C, and turn on the alarm mode, and check the temperature every 2 minutes. Please refer to the following

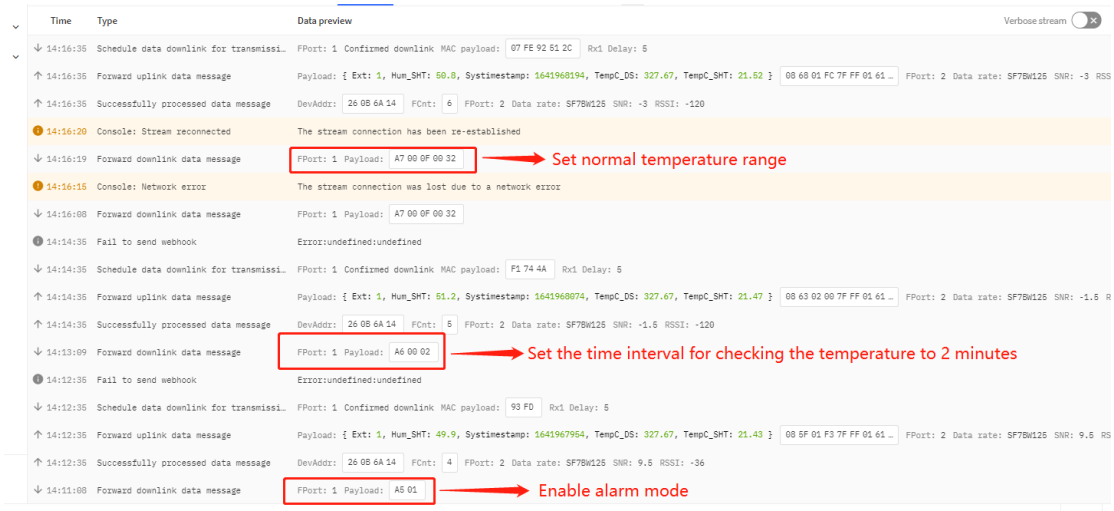




Modification via downlink,Take TTN_V3 as an example(downlink commands, please refer to the downlink command set for details)

In order to ensure that the node is indeed modified by downlink, I reset the node to factory settings first.





Or use a downlink directly: AA010002000F0032 (See command info)

14:24:19 Fail to send webhook Error:undefined:undefined
14:24:19 Schedule data downlink for transmissi.. FPort: 1 Confirmed downlink MAC payload: CB 83 73 0B 3D C9 D5 76 Rx1 Delay: 5
14:24:19 Forward uplink data message Payload: { Ext: 1, Hum_SHT: 81, Systimestamp: 1641968658, TempC_DS: 327.67, TempC_SHT: 21.77 } 08 81 01 FE 7F FF 01 61 .. FPort: 2 Data rate: SF7BW125 SNR: 9.2 RSSI: -29
14:24:19 Successfully processed data message DevAddr: 26 0B 6A 14 FCnt: 9 FPort: 2 Data rate: SF7BW125 SNR: 9.2 RSSI: -29
14:22:46 Forward downlink data message FPort: 1 Payload AA 01 00 02 00 0F 00 32
14:22:19 Fail to send webhook Error:undefined:undefined

2.8 LED Indicator

The LHT52 has a triple color LED which for easy showing different stage.

In a normal working state:

- ✓ When the node is restarted, GREEN, RED and BLUE are sequentially lit.
- ✓ During OTAA Join:

  For each Join Request uplink, the GREEN LED will blink once.

  Once Join Successful: the GREEN LED will be solid on for 5 seconds.

- ✓ After joined, for each uplink, the BLUE LED or GREEN LED will blink once.
  - ✧ BLUE LED when external sensor is connected
  - ✧ GREEN LED when external sensor is not connected
- ✓ For each success downlink, the PURPLE LED will blink once

In AT Command Mode:

If user use console cable to send AT Command to LHT52, the RED LED will always on until:

- ➢ Power off/on LHT52
- ➢ Press reset button of LHT52.
- ➢ Send an AT Command: AT+CLPM=1

2.9 Button

Press the button LHT52 will reset and join network again.

3. Configure LHT52 via AT Command or LoRaWAN Downlink

Use can configure LHT52 via AT Command or LoRaWAN Downlink.

- AT Command Connection: See FAQ.
- LoRaWAN Downlink instruction for different platforms:

http://wiki.dragino.com/index.php?title=Main_Page#Use_Note_for_Server

There are two kinds of commands to configure LHT52, they are:

- **General Commands**.

  These commands are to configure:

  - ✓ General system settings like: uplink interval.
  - ✓ LoRaWAN protocol & radio related command.

  They are same for all Dragino Device which support DLWS-005 LoRaWAN Stack(Note**). These commands can be found on the wiki:

  http://wiki.dragino.com/index.php?title=End_Device_Downlink_Command

- **Commands special design for LHT52**

  These commands only valid for LHT52, as below:

3.1 Downlink Command Set

Command Example	Function	Response	Downlink
AT+TDC=?	View current TDC time	1200000 OK	Default 1200000(ms)
AT+TDC=300000	Set TDC time	OK	0X0100012C: 01:fixed command 00012C:0X00012C=300(seconds)
ATZ	Reset node		0x04FF
AT+FDR	Restore factory settings		0X04FE
AT+CFM=?	View the current confirmation mode status	0 OK	Default 0
AT+CFM=1	Turn on confirmation mode	OK	0x0500:close 0x0501:open 05:fixed command
AT+CHE=?	View the current sub-band select 0-7, the default is 0	0 OK	Default 0

AT+CHE=2	Set subband to 2 (CN470,US915,AU915)	Attention:Take effect after ATZ OK	0X0702: 07:fixed command 02:Select subband 2
AT+WMOD=?	View the current alarm mode status	0 OK	Default 0
AT+WMOD=1	Turn on alarm mode	Attention:Take effect after ATZ OK	0xA501:open 0XA500:close A5:fixed command
AT+CITEMP=?	View the current temperature detection time interval	1 OK	Default 1(min)
AT+CITEMP=2	Set the temperature detection time interval to 2min	OK	0XA70002 A7:fixed command 0002:0X0002=2(min)
AT+NJM=?	Check the current network connection method	1 OK	Default 1
AT+NJM=0	Change the network connection method to ABP	Attention:Take effect after ATZ OK	0X2000:ABP 0x2001:OTAA 20:fixed command
AT+RPL=?	View current RPL settings	0 OK	Default 0
AT+RPL=1	set RPL=1	OK	0x2101: 21:fixed command 01:for details, check wiki
AT+ADR=?	View current ADR status	1 OK	Default 0
AT+ADR=0	Set the ADR state to off	OK	0x2200:close 0x2201:open 22:fixed command
AT+DR=?	View the current DR settings	OK	
AT+DR=1	set DR to 1 It takes effect only when ADR=0	OK	0X22000101: 00:ADR=0 01:DR=1 01:TXP=1 22:fixed command

AT+TXP=?	View the current TXP	OK	
AT+TXP=1	set TXP to 1 It takes effect only when ADR=0	OK	0X22000101: 00:ADR=0 01:DR=1 01:TXP=1 22:fixed command
	Upload node configuration or DS18B20 ID		0X2301:Upload node configuration 0x2302:Upload DS18B20 ID 23:fixed command
AT+DWELL=?	Check the high-rate upload settings	1 OK	Default 1
AT+DWELL=1	Set high rate upload (AS923,AU915)	Attention:Take effect after ATZ OK	0x2501:close 0x2500:open 25:fixed command for details, check wiki
AT+RJTDC=?	View current RJTDC set time	20 OK	Default 20(min)
AT+RJTDC=10	Set RJTDC time interval	OK	0X26000A: 26:fixed command 000A:0X000A=10(min) for details, check wiki
	Retrieve stored data for a specified period of time		0X3161DE7C7061DE8A800A: 31:fixed command 61DE7C70:0X61DE7C70=2022/1/12 15:00:00 61DE8A80:0X61DE8A80=2022/1/12 16:00:00 0A:0X0A=10(second) View details 2.6.2
AT+DDETECT=?	View the current DDETECT setting status and time	0,1440 OK	Default 0,1440(min)
AT+DDETECT=1,1440	Set DDETECT setting status and time (When the node does not receive the downlink packet within the set time, it will re-enter the network)	OK	0X320005A0:close 0X320105A0:open 32:fixed command 05A0:0X05A0=1440(min)
	Downlink Modification Alarm		0XAA010002000F00032: AA:fixed command

	Mode (AT+WMOD,AT+CITEMP,AT+ARTEMP)		01:0X01=1(AT+MOD) 0002:0X0002=2(AT+CITEMP) 000F:0X000F=15(AT+ARTEMP) 0032:0X0032=50(AT+ARTEMP)

3.2 Set Password

Feature: Set device password, max 9 digits

AT Command: AT+PWORD

Command Example	Function	Response
AT+PWORD=?	Show password	123456 OK
AT+PWORD=999999	Set password	OK

Downlink Command:

No downlink command for this feature.

4. Battery Replacement

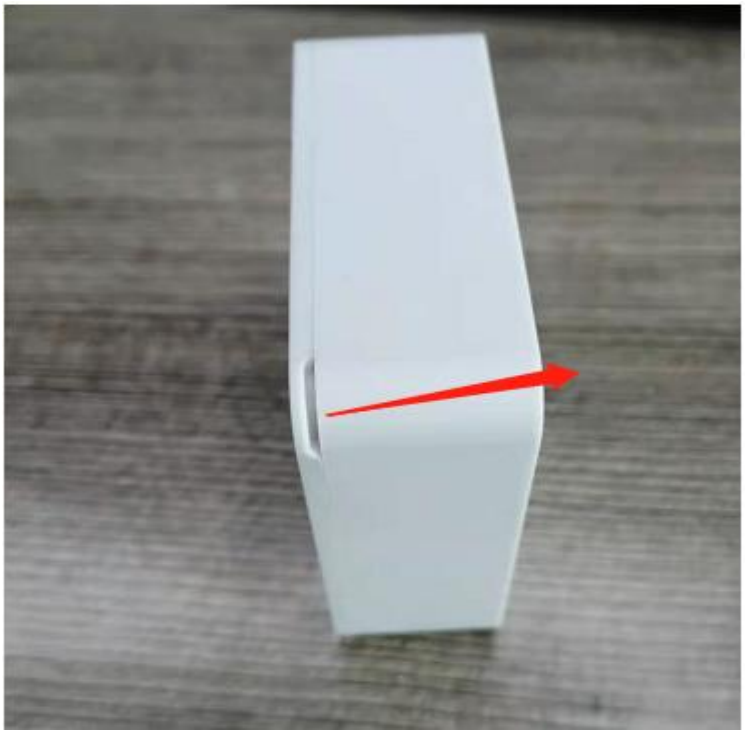
4.1 Battery Type and replace

LHT52 uses 2 x AAA LR03(1.5v) batteries. If the batteries running low (shows 2.1v in the platform).

User can buy generic AAA battery and replace it.

Note:

1) The LHT52 doesn't have any screw, use can use nail to open it by the middle.



2) Make sure the direction is correct when install the AAA batteries.

4.2 Power Consumption Analyze

Dragino battery powered product are all runs in Low Power mode. We have an update battery calculator which base on the measurement of the real device. User can use this calculator to check the battery life and calculate the battery life if want to use different transmit interval.

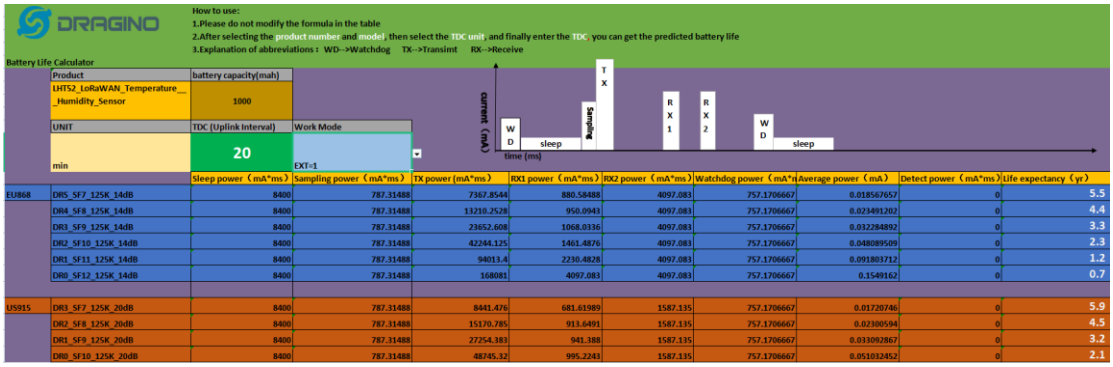
Instruction to use as below:

Step 1: Downlink the up-to-date DRAGINO_Battery_Life_Prediction_Table.xlsx from: https://www.dragino.com/downloads/index.php?dir=LoRa_End_Node/Battery_Analyze/

Step 2: Open it and choose

- Product Model
- Uplink Interval
- Working Mode

And the Life expectation in difference case will be shown on the right.



DRAGINO

How to use:
1.Please do not modify the formula in the table
2.After selecting the product number and model, then select the TDC unit, and finally enter the TDC, you can get the predicted battery life
3.Explanation of abbreviations： WD-->Watchdog TX-->Transimt RX-->Receive

Battery Life Calculator

	Product	battery capacity(mah)
	LHT52_LoRaWAN_Temperature__Humidity_Sensor	1000

	UNIT	TDC (Uplink Interval)	Work Mode
	min	20	EXT=1

		Sleep power（mA*ms）	Sampling power（mA*ms）	TX power (mA*ms)	RX1 power（mA*ms）	RX2 power（mA*ms）	Watchdog power（mA*ms）	Average power（mA）	Detect power（mA*ms）	Life expectancy（yr）
EU868	DR5_SF7_125K_14dB	8400	787.31488	7367.8544	880.58488	4097.083	757.1706667	0.018567657	0	5.5
	DR4_SF8_125K_14dB	8400	787.31488	13210.2528	950.0943	4097.083	757.1706667	0.021491202	0	4.4
	DR3_SF9_125K_14dB	8400	787.31488	23652.608	1068.0336	4097.083	757.1706667	0.032284892	0	3.3
	DR2_SF10_125K_14dB	8400	787.31488	42244.125	1461.4876	4097.083	757.1706667	0.048089509	0	2.3
	DR1_SF11_125K_14dB	8400	787.31488	94013.4	2230.4828	4097.083	757.1706667	0.091803712	0	1.2
	DR0_SF12_125K_14dB	8400	787.31488	168081	4097.083	4097.083	757.1706667	0.1549162	0	0.7
US915	DR3_SF7_125K_20dB	8400	787.31488	8441.476	681.61989	1587.135	757.1706667	0.01720746	0	5.9
	DR2_SF8_125K_20dB	8400	787.31488	15170.785	913.6491	1587.135	757.1706667	0.02300594	0	4.5
	DR1_SF9_125K_20dB	8400	787.31488	27254.383	941.388	1587.135	757.1706667	0.033092867	0	3.2
	DR0_SF10_125K_20dB	8400	787.31488	48745.32	995.2243	1587.135	757.1706667	0.051032452	0	2.1

5. Sensors & Accessories

5.1 Temperature Probe (AS-01)

External Temperature Probe base on DS18B20. (note: Default Package doesn't include AS-01)

AS-01 Temperature Probe

External Temperature Probe (AS-01):

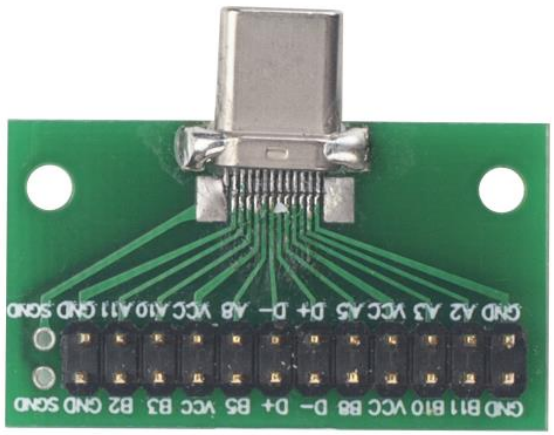
- Resolution: 0.0625 °C
- ±0.5°C accuracy from -10°C to +85°C
- ±2°C accuracy from -55°C to +125°C
- Operating Range: -55 °C ~ 125 °C
- Cable Length: 2 meters

5.2 Program Converter (AS-02)

AS-02 is an optional accessory, it is USB Type-C converter. AS-02 provide below feature:

1) Access AT console of LHT52 when used with USB-TTL adapter. See this link.
2) Update firmware to LHT52 when used with DAP-Link adapter. See this link.

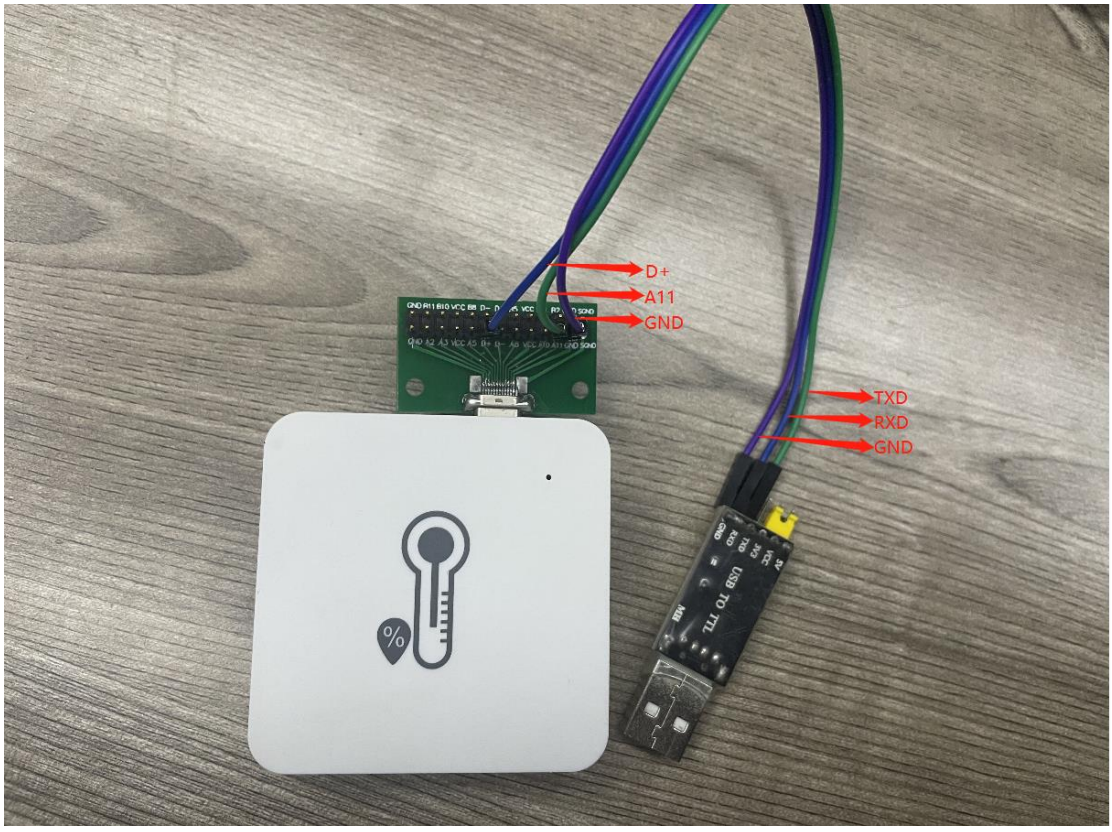
AS-02 USB Type-C Converter



6. FAQ

6.1 How to use AT Command to configure LHT52

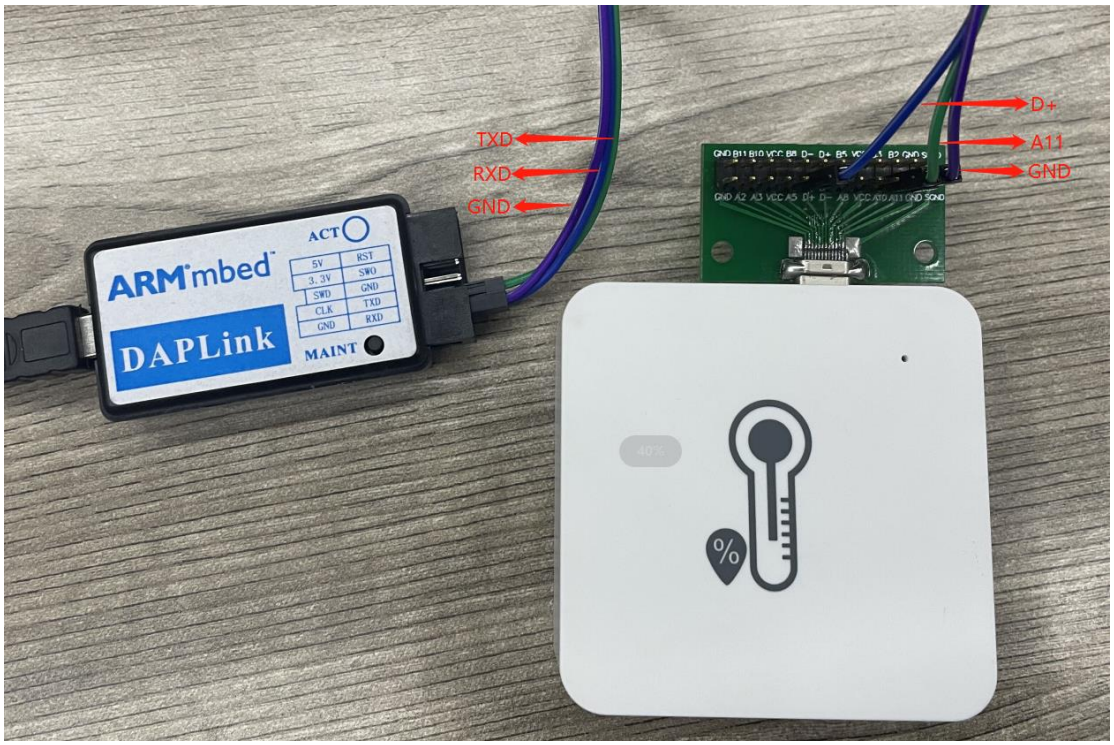
LHT52 supports AT Command set. User can use a USB to TTL adapter plus the Program Cable to connect to LHT52 for using AT command, as below.



Connection:

- ✓ USB to TTL GND <--> Program Converter GND pin
- ✓ USB to TTL RXD <--> Program Converter D+ pin
- ✓ USB to TTL TXD <--> Program Converter A11 pin

It is also possible to connect using DAPLink

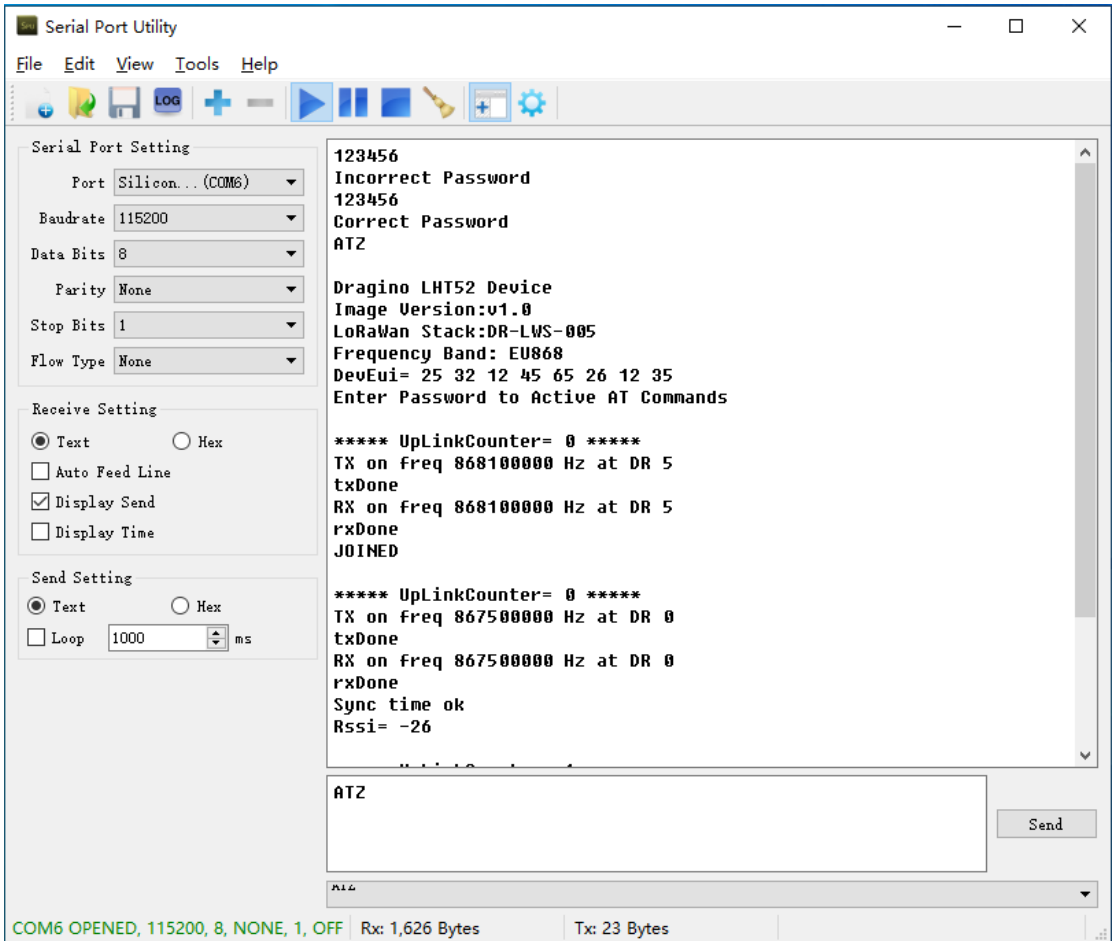


Connection:

- ✓ USB to DAP-LINK GND <--> Program Converter GND pin
- ✓ USB to DAP-LINK RXD <--> Program Converter D+ pin
- ✓ USB to DAP-LINK TXD <--> Program Converter A11 pin

In PC, User needs to set **serial tool**(such as putty, SecureCRT) baud rate to **115200** to access to access serial console for LHT52. The AT commands are disable by default and need to enter password (default:**123456**) to active it. Timeout to input AT Command is 5 min, after 5-minute, user need to input password again.

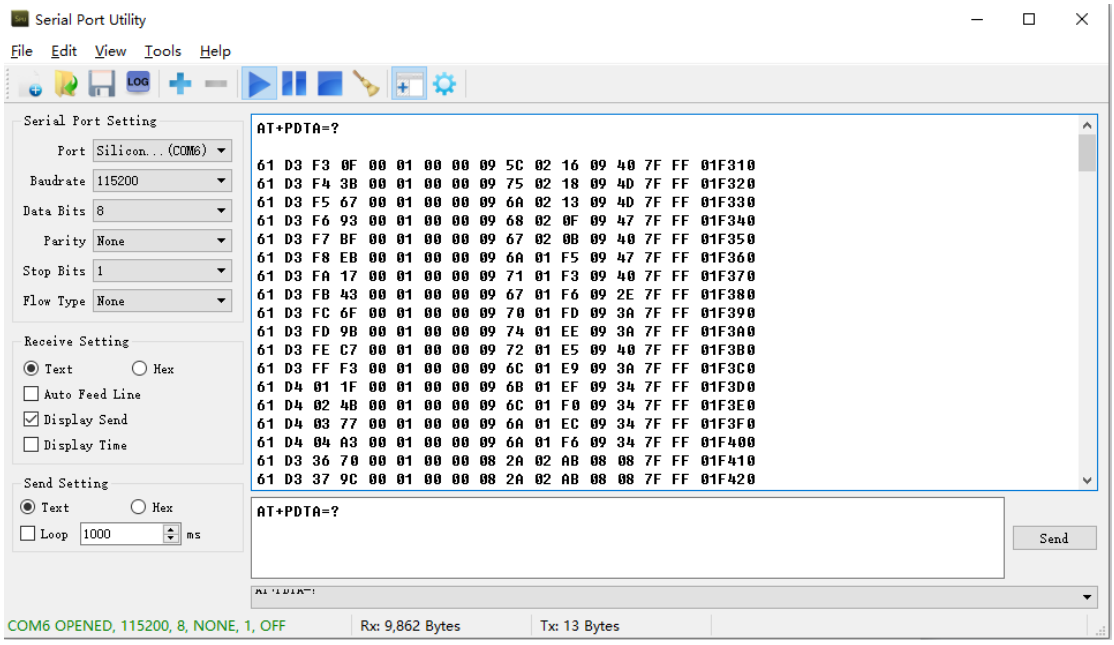
Input password and ATZ to activate LHT52,As shown below:



6.2 AT Command and Downlink

Sending ATZ will reboot the node
Sending AT+FDR will restore the node to factory settings
Get the node's AT command setting by sending AT+CFG
Example：
AT+VER=EU868 v1.0
AT+NJM=1
AT+DEUI=25 32 12 45 65 26 12 35
AT+APPEUI=25 32 12 45 65 26 32 16
AT+APPKEY=25 32 12 45 65 26 32 16 89 48 85 65 45 87 89 55
AT+DADDR=00 00 00 00
AT+APPSKEY=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
AT+NWKSKEY=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
AT+NWKID=00 00 00 13
AT+ADR=1
AT+DR=5
AT+TXP=1
AT+CHS=0
AT+CLASS=A

AT+CFM=0
AT+JN1DL=5000
AT+JN2DL=6000
AT+RX1DL=5000
AT+RX2DL=6000
AT+RX1WTO=24
AT+RX2WTO=6
AT+RX2FQ=869525000
AT+RX2DR=0
AT+RPL=0
AT+FCU=6
AT+FCD=0
AT+CFS=0
AT+NJS=1
AT+DCS=0
AT+PNM=1
AT+PWORD=123456
AT+EXT=1
AT+TDC=120000
AT+TIMESTAMP=1640851037 2021 12 30 7 57 17
AT+RJTDC=20
AT+DDETECT=0,1440
AT+WMOD=0
AT+CITEMP=1
AT+ARTEMP=-40,125
Send AT+PDTA=? to get the stored 174 data
Example：



6.3 How to upgrade the firmware?

LHT52 requires a program converter to upload images to LHT52, which is used to upload image to LHT52 for:

- ✓ Support new features
- ✓ For bug fix
- ✓ Change LoRaWAN bands.

User can check this link for the detail of operation of firmware upgrade.
https://wiki.dragino.com/index.php?title=Firmware_Upgrade_Instruction#LHT52

6.4 How to change the LoRa Frequency Bands/Region?

User can follow the introduction for how to upgrade image. When download the images, choose the required image file for download.

7. Order Info

7.1 Main Device:

Part Number: **LHT52-XX**

XX: The default frequency band

- ✓ **AS923**: LoRaWAN AS923 band
- ✓ **AU915**: LoRaWAN AU915 band
- ✓ **EU433**: LoRaWAN EU433 band
- ✓ **EU868**: LoRaWAN EU868 band
- ✓ **KR920**: LoRaWAN KR920 band
- ✓ **US915**: LoRaWAN US915 band
- ✓ **IN865**: LoRaWAN IN865 band
- ✓ **CN470**: LoRaWAN CN470 band

7.2 Accessories:

Note: below accessories are not include in the main device package, need to order separately.

Temperature Probe: AS-01

Program Converter: AS-02

8. Packing Info

Package Includes:

- ✓ LHT52 Temperature & Humidity Sensor x 1

9. Support

- ➢ Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones we cannot offer live support. However, your questions will be answered as soon as possible in the before-mentioned schedule.
- ➢ Provide as much information as possible regarding your enquiry (product models, accurately describe your problem and steps to replicate it etc) and send a mail to

support@dragino.com

10. FCC Warning

This device complies with part 15 of the FCC Rules.Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received,including interference that may cause undesired operation